

Solar Effects of Low-Earth Orbit objects in ORDEM 3.0

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Variances in atmospheric density are directly related to the variances in solar flux intensity between 11-year solar cycles. The Orbital Debris Engineering Model (ORDEM 3.0) uses a solar flux table as input for calculating orbital lifetime of intact and debris objects in Low-Earth Orbit. Long term projections in solar flux activity developed by the NASA Orbital Debris Program Office (ODPO) extend the National Oceanic and Atmospheric Administration Space Environment Center (NOAA/SEC) daily historical flux values with a 5-year projection. For purposes of programmatic scheduling, the Q2 2009 solar flux table was chosen for ORDEM 3.0. Current solar flux activity shows that the current solar cycle has entered a period of lower solar flux intensity than previously forecasted in 2009. This results in a deviation of the true orbital debris environment propagation in ORDEM 3.0.

In this paper, we present updated orbital debris populations in LEO using the latest solar flux values. We discuss the effects on recent breakup events such as the FY-1C anti-satellite test and the Iridium 33 / Cosmos 2251 accidental collision. Justifications for chosen solar flux tables are discussed.